SBN Far Detector Building Hazard Awareness Training Handout

Version 1.2
31 May 2017

Overview

The installation phase of the SBN-FD experiment presents many potential hazards. This document is intended to inform you of the potential hazards you may encounter in the SBN-FD building and the proper precautions to take to reduce risks. Please read the entire document, then either take the online test, or sign and submit the signature sheet at the end. As new phases are entered, updated versions of this document will be released and retraining will be required.

1 Introduction

This training document outlines the hazards specific to the SBN-FD building.

Upon entering the SBN-FD building, you MUST check the Notification Board (located in the main entrance) for the updates on current hazards. If you may be creating any hazards with your work, inform the SBN-FD Floor Manager (or designee) so that this information can be included on the Notification Board.

If you find a situation in which you need advice, training, review or a decision in regards to safety or safe operations, you should first consult with your immediate supervisor. If you and your supervisor conclude that the matter goes beyond your own group, that you need assistance in resolving it, or that you need to arrange for safety training, you should contact the Neutrino Division Safety Officer (ND DSO), Angela Aparicio (x3701, asands@fnal.gov). In the event of an emergency, you should call ext. 3131 from any Fermilab telephone.

Environmental Safety, Health & Quality (ESH&Q) materials referenced in this document can be consulted for guidance on ESH&Q issues. These materials can be found on-line at this URL: http://esh.fnal.gov/xms/

1.1 Planning Your Work

Prior to initiating new work at the SBN-FD you need to contact the SBN-FD Installation Manager, Fernanda Garcia (fgarcia@fnal.gov) . Depending on the scale, complexity, and associated safety hazards you may be asked to make a small presentation at the weekly SBN-FD Installation Meeting. The appropriate ES&H documentation and sign-offs will be required prior to starting any new work.

Daily planning and coordination on site at the SBN-FD building will be performed by the SBN-FD Floor Manager.

ES&H oversight will be provided by the the ND DSO, Angela Aparicio (x3701).

Issues of building maintenance should be directed to the SBN-FD Building Manager, Bryan Johnson (x2186 or x2820, bjohnson@fnal.gov).

The Facility Coordinator is Stephen Hahn (x2123, hahn@fnal.gov).

1.2 Programs for Controlling Hazards

The ES&H programs for controlling the hazards that may be found within the facility generally have three parts: (1) reviews to minimize hazards of new systems; (2) personnel training; and (3) documented operating and safety procedures or guidelines to follow. In addition, work activities performed by Fermilab employees and users shall be reviewed via a Job Hazard Analysis (JHA) before work is started (see Chapter 2060 of the Fermilab Environmental, Safety, and Health Manual (FESHM)). Reviews to minimize hazards in the design, construction, and operation of new systems are conducted by specific review committees or ESH&Q personnel. If you are involved in an operation that you feel should be reviewed or is required to be reviewed, contact your supervisor or the facility coordinator/spokesperson. Training courses are conducted by supervisors or the Fermilab ESH&Q Section, depending on the specific need. Written procedures and job hazard analyses are usually developed by those doing the work and their supervisors, in consultation with ESH&Q personnel when necessary.

2 General Hazards

The SBN-FD building has many features which open to the lower levels. The large openings are covered or protected with standard railings. Additional fall protection measures and barricading may be needed when covers or railings are removed; contact the ND DSO before removing railings or covers so that the need for fall protection or barricading can be assessed. Covers and railings need to be put back into position when work requiring their removal is complete. Use caution leaning over the edges of the openings so that hard hats, phones, or other objects are not dropped below. There are many conduit penetrations in the floors that may or may not be terminated at this stage of the project. Take care especially around the perimeters of the building for these trip hazards.

3 Electrical Hazards

Many components utilize potentially dangerous high voltages and/or currents. In addition, certain electrical devices/components may retain significant electric charge after their high-voltage sources are removed. These sources of energy can cause electric shock to personnel if work on these devices is carried out improperly. All employees and users are required to have taken New Employee/User ESH&Q Orientation (or a prior equivalent), which includes Electrical Safety Orientation [FN000387] Training, a brief orientation to the Fermilab Lockout/Tagout (LOTO) program and NFPA-70E for unqualified workers. People performing service or maintenance work on or near equipment that could cause them injury if it were to become energized must lockout and tagout that equipment's energy source(s) and must have current Fermilab LOTO Level 2 [FN000212] Training.

Only LOTO Level 2 trained personnel are authorized to work on equipment that could become hazardous to them if that equipment were unexpectedly energized. LOTO requires the use of a designated red lock and a DANGER tag to isolate the hazardous stored energy source (e.g., electricity, gravity, springs). Additional information about LOTO can be found in Chapter 2100 of the FESHM.

> *NOTE: The term "configuration control" applies to the lockout and tagging of equipment that could not jeopardize worker safety. The application of "configuration control" locks does not require LOTO Level 2 Training or procedures and should be implemented with a (non-red) padlock and a CAUTION tag.*

A common hazard is ‘daisy-chaining’ of extension cords and power strips. Extension cords and power strips are designed to be used individually and not connected to others in series. Such improper installations can become a fire hazard by creating an over-current condition. Figure 1 shows examples of acceptable and unacceptable usages of extension cords and power strips. These are examples of configurations that have been found onsite at Fermilab, however acceptable and unacceptable configurations are not limited to the examples. Contact the building manager if you have any questions.

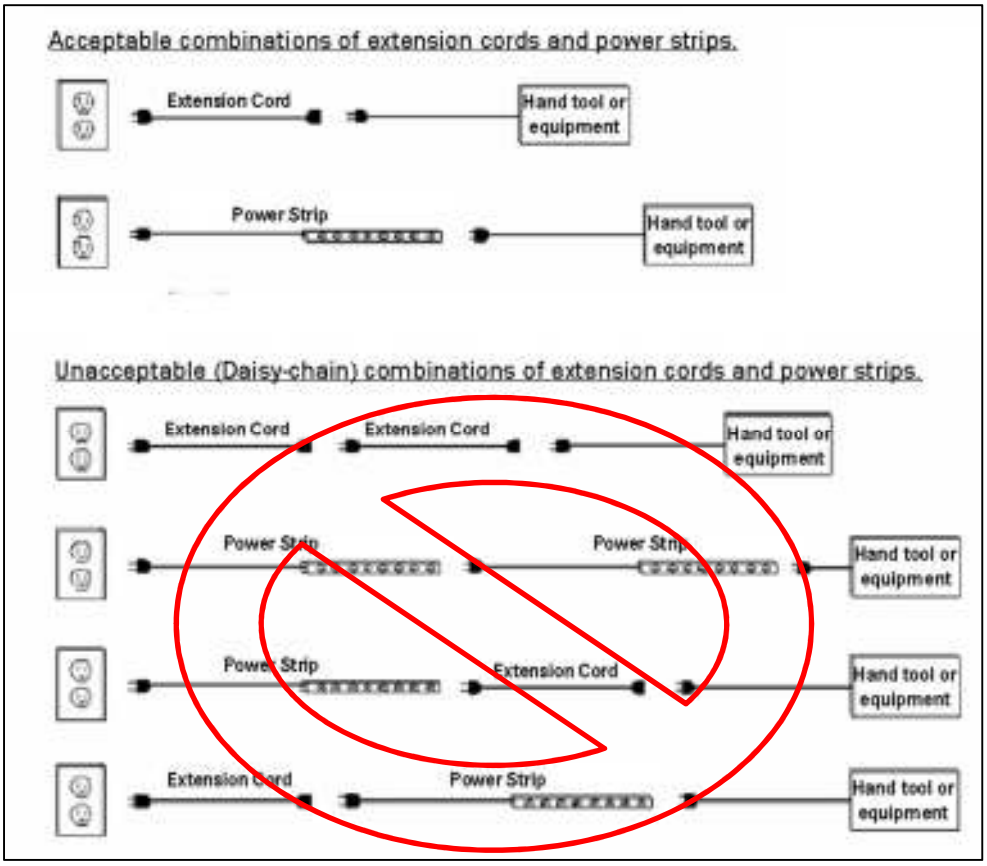

Figure 1. Examples of Acceptable and Unacceptable Combinations.

4 Hazardous Materials

Small amounts of chemical materials, such as epoxies and solvents, are used or stored in certain areas. If handled incorrectly, some of these materials may become harmful. As a general practice, the use of combustibles should be limited. All hazardous (e.g., flammable, corrosive, reactive, or toxic) materials that are not in use must be stored in specially designated cabinets. Flammable liquids, such as acetone, must be stored in a Flammable Liquids Cabinet. Figure 2 shows an example of a Flammable Cabinet. Rags or Kim Wipes used in the application or cleanup of such solvents must be collected in flammable rag containers. Safety Data Sheets (SDS's) containing information on all of these and other materials within the facility can be found online at http://www-esh.fnal.gov/pls/ip/msds_search.html. Additional information regarding chemical hazard communication is outlined in Chapter 4110 of the FESHM.

Figure 2. Example of a Flammable Cabinet.

Specific Hazards Associated with Hazardous Materials at the SBN-FD Facility:

Any cutting, coring/drilling of concrete requires ESH review of the work. Contact the ND DSO. Depending on the type and amount of work, controls such as a HEPA vacuum or respiretory protection may be required. See the Fermilab Silica Guidance Table for more information.

5 Environmental Hazards

An accidental release of some materials (e.g., oil, gasoline, diesel fuel) from certain equipment could become harmful if it is not promptly contained. Such a release can be considered harmful if it can potentially cause adverse effects to people or the environment. If you know or suspect that such a release has occurred or is likely to occur, call ext. 3131 to report a spill emergency. Designated personnel are trained to execute procedures designed to minimize the spread of accidentally released materials. In addition, the following materials are prohibited from disposal in trash cans and dumpsters:

- all hazardous (e.g., flammable, corrosive, reactive, toxic) materials
- degreasing agents (e.g., Freon)
- uncured epoxy
- ethylene glycol ("anti-freeze")
- fluorescent light bulbs
- oils
- paints
- pesticides
- radioactive material, radiation signs and labels
- scrap metal
- NiCad, lead/acid, and lithium batteries
- any free liquids (regardless of chemical nature)

Contact the ND DSO, the ESH&Q Section Environmental Protection Group or the building manager for waste determination and disposal requirements. Whenever possible, please recycle rather than throw away materials that are no longer of use.

6 Hazards Associated with Operating Machinery

6.1 Cranes and Forklifts

Improper use of certain equipment, such as cranes and forklifts, can endanger people working in the area as well as material being moved. People operating cranes and forklifts must complete operator training and renew this training every three years. Operators must warn others of approaching loads and ensure all personnel are clear from the area of the lift. All personnel are prohibited from the area near or under any suspended load. Hard hats are required in the area of crane operation, as defined by the crane operator, whenever the crane is in operation. Procedures for crane use can be found in the FESHM.

6.2 Power Tools

Power tool operations present hazards due to moving parts. Work with some power tools requires the use of Personal Protective Equipment (PPE). Any loose clothing or jewelry that might become entangled

must be removed prior to operating these tools. Hair that might become entangled should be covered or tied back. All hammering, drilling, cutting, grinding, and power tool operations require the use of protective eyewear (e.g. safety glasses or goggles) with side shields that fit snugly to the face. In addition to glasses or goggles, grinding operations also require the use of a full-face shield. Some operations may require other forms of PPE (e.g., hearing protection, gloves). Manufacturer's recommended operating instructions are a good source of information on how to operate equipment safely.

6.3 Aerial Lifts

Aerial lifts are devices used to elevate personnel to sites above ground and include articulating or extensible boom platform lifts, scissor lifts, and manlifts. Hard hats are required whenever working in an area where lifts are in use. Anyone working from a telescoping and or articulating boom lift must wear a personal fall arrest system attached to the manufacturer's designated anchorage point. The use of a personal fall arrest system is not required on scissor lifts if the guardrail system is intact. See FESHM 10180 for requirements pertaining to aerial lifts.

Improper use or poor maintenance of aerial lifts can pose a serious safety hazard. Fermilab employees and users who will utilize aerial lifts must take the Fermilab course on the proper operating procedures, and hazards associated with the equipment and operating the equipment.

7 Hazards Associated with Working at Heights

There are unusual places throughout the facility from which people or things have the potential to fall. These include work from ladders, scaffolds, and aerial lifts, etc.. The physical condition of guardrails should always be inspected prior to working near or leaning on them. The physical condition of ladders and scaffolds should always be inspected prior to their use and must be used in accordance with all posted instructions and/or safety precautions. Personnel lifts are available in some areas for workers trained in their use. Work from an aerial lift requires Aerial Lift Training (FN000532). Work from elevated platforms that have no railings requires Fall Protection Orientation Training [FN000304], the use of a body harness and lanyard, and a written rescue plan in the associated hazard analysis. Hard hats must be worn whenever someone is working above you or during rigging activities. Additional requirements and procedures regarding the use of aerial lifts can be found in Chapter 10180 of FESHM.

It is common for work to be conducted at elevations above floor level. When working with ladders, a number of rules apply:

- Always use the appropriate ladder for the job. Avoid reaching or leaning from a ladder to complete a task.
- When ladders are not in use, they must be stored in a secure location that will not cause an obstruction to walkways or workspaces.
- The physical condition of ladders and scaffolds should always be inspected prior to use and must be used in accordance with any posted instructions and/or safety precautions.
- Do not climb on the cable trays. Use the appropriate equipment (e.g. ladder, scissors lift) as needed to safely access the tray.

8 Hazards Associated with Compressed Gas and Pressure Vessels

Many facilities contain systems and operations that utilize compressed gases and pressure vessels that may become hazardous if ruptured or handled improperly. All gas cylinders must be properly regulated

while used and capped while stored. They also must remain protected from falling down at all times, for example by securing them to a storage rack or other solid object. Only trained personnel should handle compressed gasses. You can find the Fermilab Compressed Gas Training [FN000213] here: http://www-esh.fnal.gov/pls/default/class_sched.html. Additional requirements and procedures regarding compressed gas systems and pressure vessels can be found in Chapter 5031 of the FESHM.

9 Radiation Hazards

Currently, there is no radioactive material present within the SBN-FD building. Personnel are required to complete the General Employee Radiation Training (GERT) training bi-annually. The ND Radiation Safety Officer can be contacted regarding any questions about radiation protection postings or other aspects of the radiation protection program.

Specific Hazards Associated with Radiation at the SBN-FD Facility:

SBN-FD is located along the Booster Neutrino Beam (BNB). The beam neutrinos and interactions resulting from them do not pose a radiation hazard and SBN-FD is not a Radiation Area when the BNB is operating. GERT is the only radiation safety training required to enter this facility.

Class 3b and 4 lasers must be registered with the Fermilab Laser Safety Officer (LSO) and the LSO must give approval before Class 3b or 4 lasers can be operated. See FESHM Chapter 4260 for more information.

10 Emergencies

Call ext. 3131 from a lab phone (630-840-3131 from a cell phone) in the event of an emergency situation, such as personnel requiring medical treatment for any reason. Stay on the phone until the emergency operator indicates that s/he has all of the necessary information, including your name, location and nature of the emergency. Do not attempt to bandage another person or clean any bodily fluids from another person's injury.

Take note of the exits in the areas where you are working; exits are marked with illuminated signs. When evacuating any area, proceed to the designated assembly point and wait there until the 'all clear' signal is given. If you must leave and can't wait for the 'all clear', tell your supervisor or an Emergency Warden. Rescue attempts will be made by the Fire Department if someone is unaccounted-for and believed to be in an unsafe area (e.g., burning structure, oxygen deficient area). If you notice that a fellow worker is missing during an emergency, immediately report this to an Emergency Warden, the Incident Commander (Fire Dept.) or the Fire Chief.

10.1 Steady Alarm

This is a fire alarm and it means that smoke or fire has been detected in the area.

Specific Procedures for a Steady Alarm at the SBN-FD Facility:

Exit via the closest exit door; gather at the emergency assembly area, located in the SBN-FD parking lot.

10.2 Whooper Alarm

This is a hazardous atmosphere (i.e., ODH) or interlock alarm. During the experiment installation period no ODH system is in place.

Specific Procedures for a Whooper Alarm at the SBN-FD Facility:

Exit via the closest exit door; gather at the emergency assembly area, located in the SBN-FD parking lot .

10.3 Sitewide Emergency Warning System (SEWS)

This is a verbal communication system broadcast throughout all areas of the laboratory. It is used to notify personnel when hazardous conditions exist and what protective actions to take. It is very important that you respond to its warning tones and messages and that you follow the transmitted instructions. If the nature of the message indicates severe weather (e.g. a tornado), promptly go to the designated shelter for your area.

Specific Procedures for a SEWS Message at the SBN-FD Facility:

The designated shelter areas are any of the stairwells. Proceed to the lower levels of the stairwell, without exiting the stairwell. Remain in the shelter until given directions via the safety alert monitor that it is safe to exit.

10.4 Fire Suppression System

Specific Fire Suppression System at the SBN-FD Facility:

SBN-FD utilizes an automatic sprinkler system. Manual pull stations are located at building exits; activate a pull station in the event that the alarm system has not activated but signs of fire are present. Activating a pull station will activate the building fire alarm system horns and strobes, and summon the Fire Dept. Smoke detectors are also located throughout the building.

11 Hazards Associated with Sustained High Noise Levels

Extended exposure to certain areas where high noise levels are common can cause hearing damage to people without proper hearing protection. These areas are posted accordingly and have the appropriate hearing protection available. Additional information on hearing conservation can be found in Chapter 4140 of the FESHM.

Specific Hazards Associated with Sustained High Noise Levels at the SBN-FD Facility:

Some tools and equipment used during the installation period may generate high noise levels. Signs that the noise level is hazardous include if you are unable to hear a person talking (without shouting) standing 3 feet from you. If you believe the noise levels are excessive, contact the ND DSO or the ESH&Q Section Industrial Hygiene Group, who can review the work and noise levels to determine if engineering controls or personal protective equipment is required.

12 Cryogenic Hazards

There may be areas within the facility where cryogens such as liquid nitrogen or argon may be routinely present. A leak of these materials can cause local zones of oxygen deficiency. In addition, there may be areas where acute physical hazards associated with handling cryogenic materials, such as burns to the eyes and skin, are possible. When cryogenic materials are handled, appropriate PPE, such as gloves and protective eyewear with side shields, must be worn. Additional information regarding the controls and procedures required of cryogenic and ODH areas are contained in Chapters 5032 and 4240 of the FESHM.

Specific Cryogenic Hazards at the SBN-FD Facility:

Anyone who may handle large (160 liter) dewars must complete Large Portable Liquefied Gas Dewar Handling [FN000475].

13 Confined Spaces and Limited Access Areas

Confined spaces are locations in which hazards, such as poor illumination, difficult emergency escape and ODH, can be intensified. A written permit and Fermilab Confined Spaces [FN000003] Training is required for access to any confined space. Additional policies and procedures regarding access to confined spaces can be found in Chapter 4230 of the FESHM.

Specific Confined Spaces and Limited Access Areas at the SBN-FD Facility:

The sump pit, warm vessel and cryostats are confined spaces. Do not enter unless you have a completed entry permit. Contact the ND DSO or the ESH&Q Section Industrial Hygiene Group for entry permit approval.

14 Miscellaneous

The following describes some additional general hazards and work rules which exist within the facilities:

- Smoking at facilities is permitted only outdoors and at least 15 ft. from the nearest indoor entrance.
- All new visitors working at Fermilab must register with the Users' Office (WH Mezzanine, ext. 3111) upon their arrival.
- It is always preferred that people not work alone. When this is impractical, workers should at least ensure that another person, such as their supervisor, is aware of when and where they are working, and they should make arrangements to periodically check-in with that person. This is especially important for work during off-hours. Also note that for some types of jobs, explicit "two-man rule" requirements may exist.
- **Nothing** must be attached to or suspended from overhead sprinkler pipes.
- Since janitorial personnel do not service some areas within the facilities, you must clean up after yourself.
- Proper personal protective equipment (PPE) must be worn. The minimal PPE is safety glasses, work boots, and a hardhat. Long pants and a sleeved shirt must also be worn. Additional PPE may be required for various situations. Consult the written hazard analysis, your supervisor, the SBN-FD Floor Manager (or designee), or the ND DSO if unsure what PPE is necessary.
- Keep the roll-up door closed as much as possible to reduce the burden on the Heating, Ventilation and Air Conditioning (HVAC) system and help keep the area clean.

15 SBN-FD Building Hazard Awareness Quiz

Name: _____ ID#: _____ Date: _____

1) When you enter the SBN-FD building, what is the first thing you should do?
   a) Locate the bathrooms
   b) Check for cell phone coverage
   c) Get a cup of coffee
   d) Read the Notification Board in the Main Entrance
   e) Take a photograph

2) What actions should you take if you hear the tornado sirens?
   a) Stay on the main level of the building
   b) Take shelter in one of the stairwells
   c) Get in your vehicle and drive home
   d) Go to the roof to look for tornadoes

3) What actions should you take if you hear a fire alarm?
   a) Take shelter in one of the stairwells
   b) Investigate if there is really a fire
   c) Evacuate the building and gather in the SBN-FD parking lot
   d) Get in your vehicle and go home

4) What should you do in the event any person requires medical treatment?
   a) Panic
   b) Call extension 3131
   c) Call the installation coordinator
   d) Call the Main Control Room
   e) Treat the person with a first aid kit

5) Which of the following actions requires specific training prior to being performed?
   a) Work from elevated platforms (Fall Protection Orientation)
   b) Operation of cranes, forklifts or manlifts (Operator Training)
   c) Handling of compressed gases (Compressed Gas Cylinder Safety)
   d) Work on equipment that could become hazardous if equipment were unexpectedly energized (LOTO 2)
   e) All of the above

6) What personal protective equipment (PPE) is required when working in the vicinity of aerial or scissor lifts that are in use?
   a) Hard hat
   b) Face shield
   c) Flip flops
   d) Gloves
   e) All of the above

7) Where can you store a flammable liquid (e.g. ethanol, acetone) overnight?
   a) Anywhere, as long as it is labeled
   b) In your work area
   c) In a toolbox
   d) In a special cabinet designated for flammable liquid storage
   e) B & C

8) It is acceptable to plug one electrical extension cord into a multiple outlet strip (power strip).
   a) True
   b) False

9) What should you do if you find an unsafe situation?
   a) Ignore it
   b) Immediately contact the Division Head
   c) Stop work immediately and inform your supervisor or DSO
   d) Immediately inform the Fire Department
   e) None of the above

10) If you want to initiate new work in the SBN-FD building you should
   a) Do it quickly before anyone notices
   b) Contact the SBN Installation Manager
   c) Keep your plans to yourself so they won't be criticized
   d) Delay all planning until the last minute
   e) A & C

16 Signature Page and Training Record

"I have read the **SBN-FD Hazard Awareness Training Handout** and understand the hazards present within the facility. Also, I agree to follow all of the listed work rules and emergency procedures."

Print your name: _____Fermilab ID#: _____

Division/Section/Affiliation: _____Department/Group: _____

Fermilab Phone #: _____ Mail Station: _____

Email address: _____

Your signature: _____

Today's Date: _____

If you have not completed this training online, please complete the quiz and this form and return both to:

Angela Aparicio, MS 119

----------FOR ADMINISTRATIVE USE ONLY----------

Course: SBN-FD Hazard Awareness Training (NDSBNFD1/CB/01)

Quiz score: _____/10 (score < 8 = fail)

TRAIN group assignment: _____

Authorization: _____
(Must be signed by ESH&Q personnel)